



# ***The U.S. Navy's Arctic Roadmap: Adapting to Climate Change in the High North***

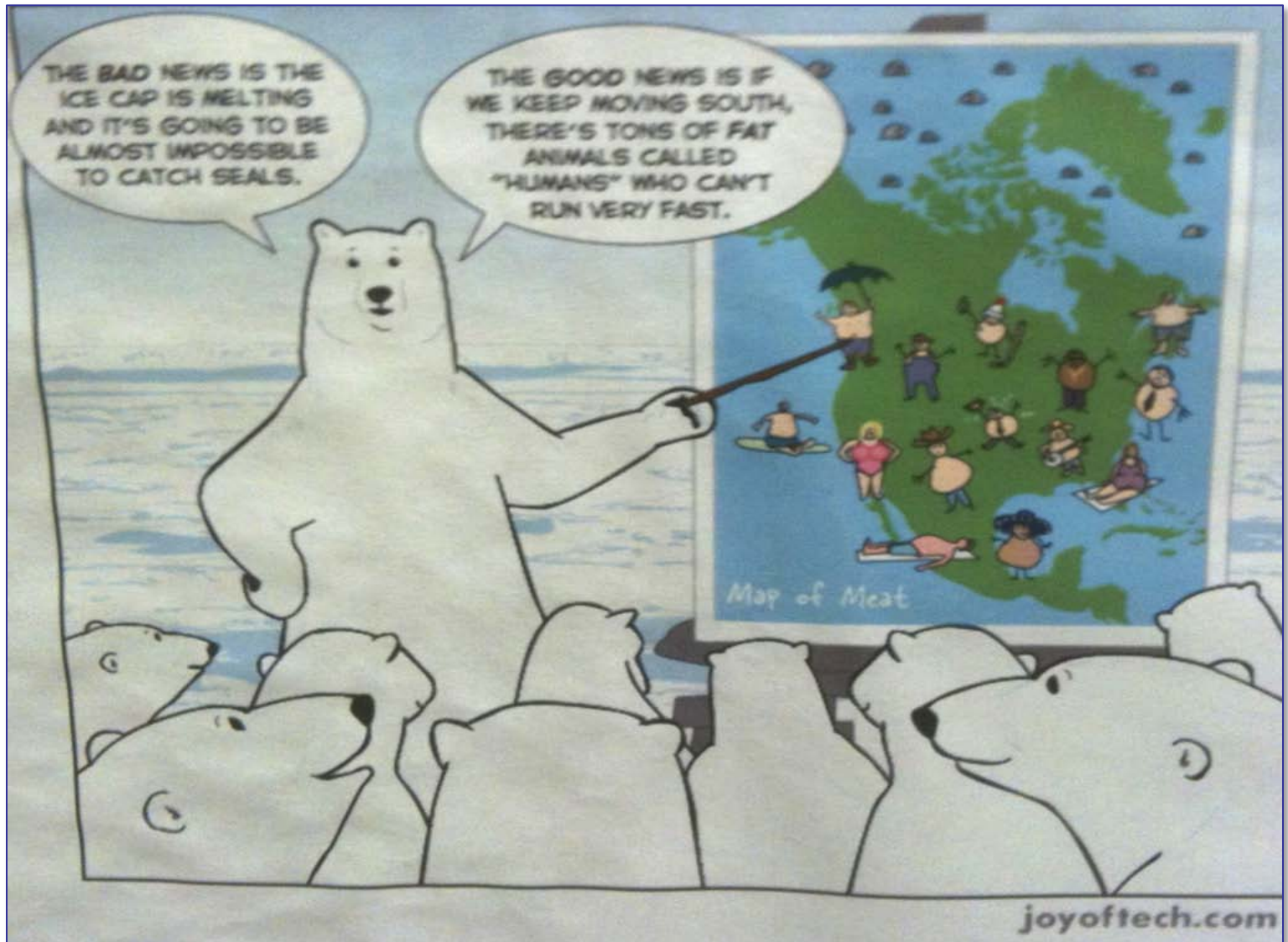


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May 2011**

Report Documentation Page				Form Approved OMB No. 0704-0188	
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1. REPORT DATE <b>MAY 2011</b>		2. REPORT TYPE		3. DATES COVERED <b>00-00-2011 to 00-00-2011</b>	
4. TITLE AND SUBTITLE <b>The U.S. Navy's Arctic Roadmap: Adapting to Climate Change in the High North</b>				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>Chief of Naval Operations, Task Force Climate Change / Office of the Oceanographer of the Navy, 2000 Navy Pentagon, Washington, DC, 20350-2000</b>				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT <b>Approved for public release; distribution unlimited</b>					
13. SUPPLEMENTARY NOTES <b>Presented at the NDIA Environment, Energy Security &amp; Sustainability (E2S2) Symposium &amp; Exhibition held 9-12 May 2011 in New Orleans, LA.</b>					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT <b>Same as Report (SAR)</b>	18. NUMBER OF PAGES <b>20</b>	19a. NAME OF RESPONSIBLE PERSON
a. REPORT <b>unclassified</b>	b. ABSTRACT <b>unclassified</b>	c. THIS PAGE <b>unclassified</b>			



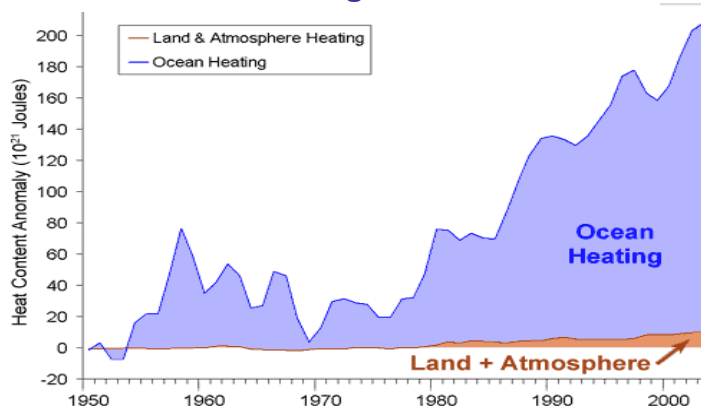
## *In Case You Have Not Heard ...*





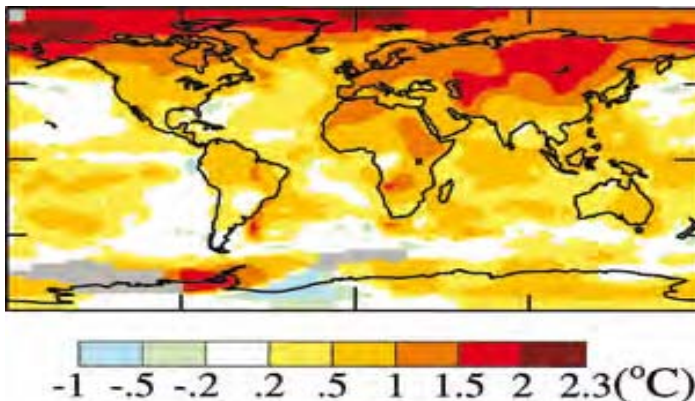
# Climate Change Update

## The Ocean is Storing Most of the Heat



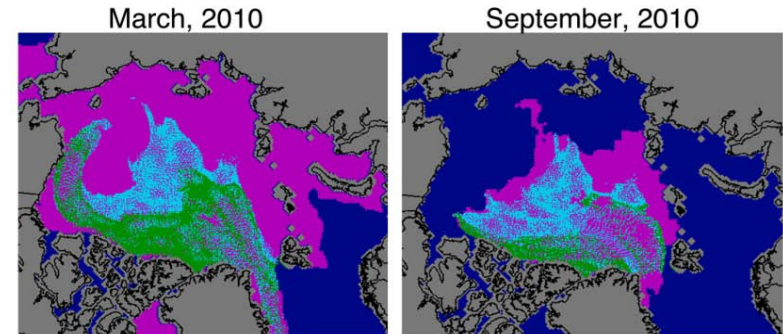
Total Earth Heat Content from 1950 (Murphy 2009). Ocean data taken from Domingues et al 2008

## Arctic Warming is 2 x the Rest of the World



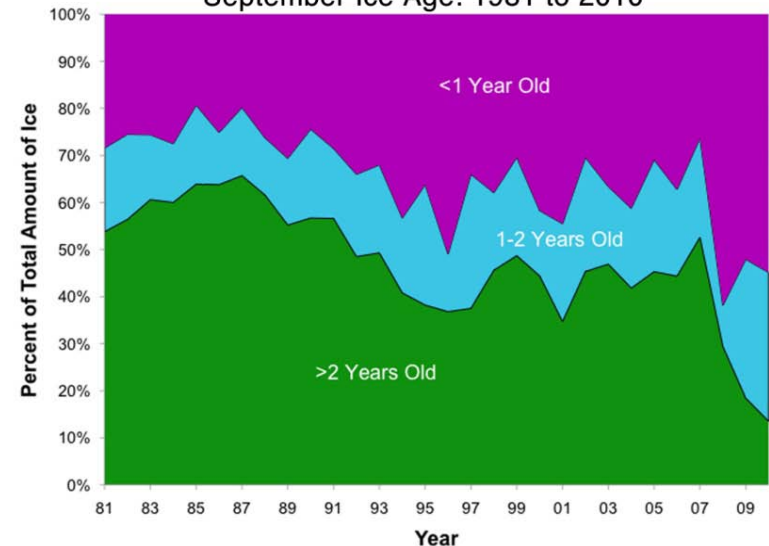
Mean surface temperature 2001-2007 relative to baseline period 1951-1980, from: The Copenhagen Diagnosis, 2009

## Arctic Sea Ice Continues to Melt & Thin



First-year ice (<1 year old) Second-year ice (1-2 years old) Multiyear ice (>2 years old)

## September Ice Age: 1981 to 2010



NSIDC courtesy J. Maslanik and C. Fowler, CU Boulder





# Why the Navy Cares

## Near-term

- Increasing Arctic maritime activity
- Partnership opportunities
- Energy security initiatives



## Mid-Term

- Sea level rise impact on installations
- Water/resource challenges
- Potential increase in Humanitarian Assistance/Disaster Response



## Wild-cards

- Ocean acidification
- Abrupt climate change
- Geoengineering

*Challenges and opportunities exist*



# Task Force Climate Change

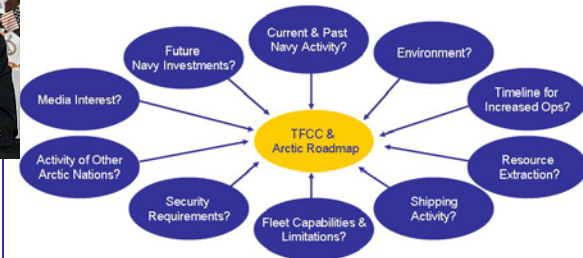
## Establishment

Chief of Naval Operations  
Executive Board on May 15, 2009



### Key Questions

Chief of Naval Operations Executive Board  
May 15, 2009



UNCLASSIFIED

6

## Composition

Navy, NOAA, USCG in core group with  
Joint, interagency, international support



## Charter

Global climate change impacts with near term Arctic focus



# The Team...

## INTERAGENCY



## NATIONAL



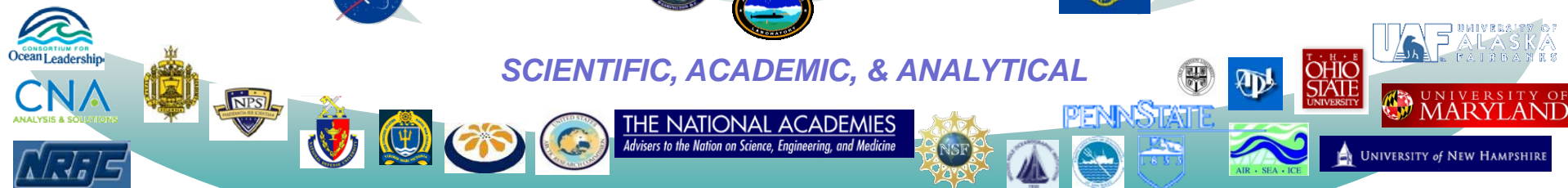
## DOD



## INTERNATIONAL



## SCIENTIFIC, ACADEMIC, & ANALYTICAL



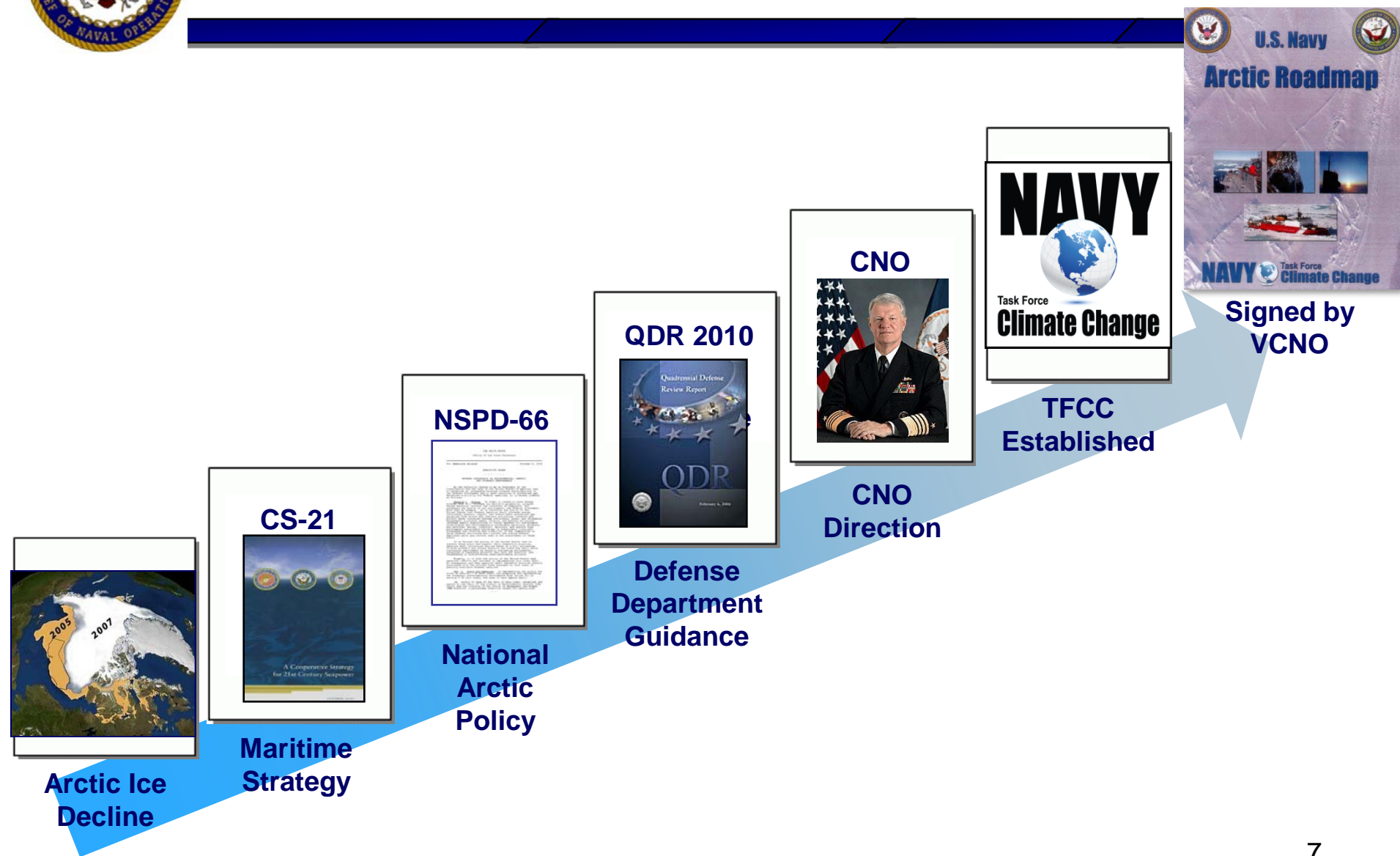
Engaged nearly 600 individuals from over 175 organizations

UNCLASSIFIED





# Arctic Drivers

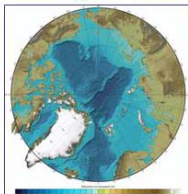






# Arctic Considerations

Poorly Charted



Limited Infrastructure



Harsh Operating Environment



Security Concerns



Transportation Access



## Native Perspectives

Gulf Coast, 2005



Unalakleet, 2040



## One Scenario



+



=



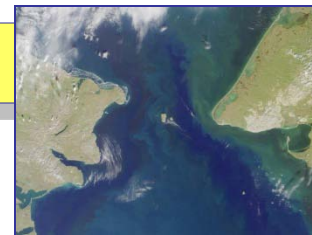
**The Arctic is an ocean, a challenge, but NOT a vacuum**



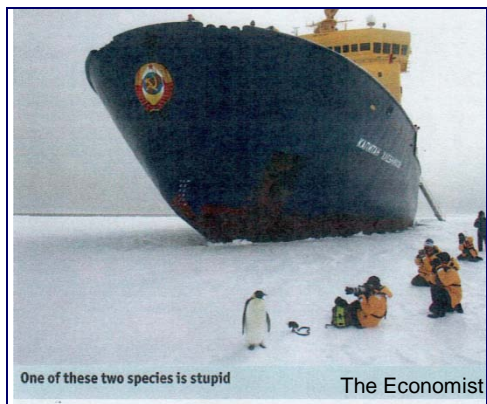
# Arctic Trends Assessment

**Commercial activity remains limited through 2030**

- Shipping, oil, & gas extraction to grow after 2030
- Tourism & maritime research will increase the most
- Fishing to grow but only gradually



*..but after 2050?*

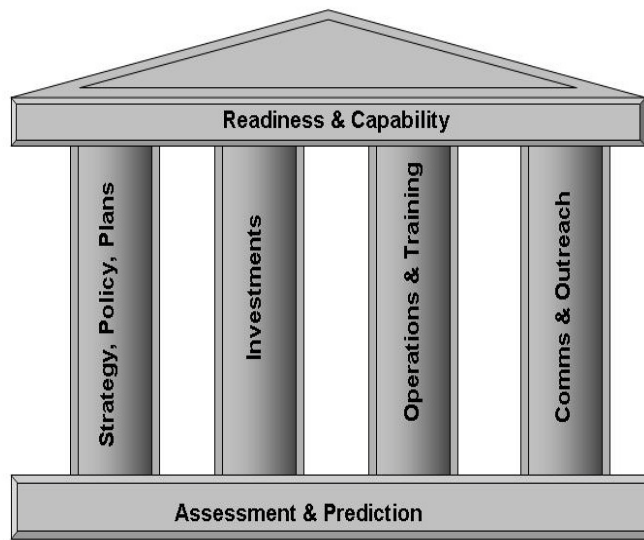


**Harsh operating environment will remain the greatest limiting factor**



# Navy Arctic Roadmap

## Framework



## Execution

### Phase 1 (FY10)

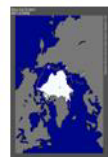
Fleet readiness assessment, external studies, strategic implementation plan



Monitor Polar SATCOM Program<sup>stake</sup>



Arctic TTX & LOE



POM-12 investments for air-ocean-ice numerical prediction



Advocate for UNCLOS<sup>stake</sup>

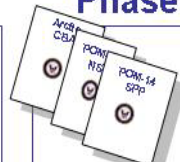


Innovative Readiness Training (IRT)<sup>stake</sup>



Cooperative Navy-NOAA Bering Strait Hydrographic Survey

### Phase 2 (FY11-12)



POM-14 CBA, NSP, & SPPs address the Arctic



Formalize expanded / new cooperative partnerships



Arctic SAREX, Arctic Edge, Northern Edge NANOOK<sup>stake</sup>



ICEX-11



Environmental assessments



Support National Ocean Policy / Marine Spatial Planning Implementation For Arctic<sup>stake</sup>

Interagency partnership for air-ocean-ice numerical prediction

### Phase 3 (FY13-14)



Execute POM-14



Implement expanded / new cooperative partnerships



Arctic UUV operations



ICEX-13

Update roadmap ICW QDR



**Navy recognized as a valued joint, interagency, & international partner in the Arctic**

<sup>stake</sup> Indicates recurring action





# Recent Arctic Activity

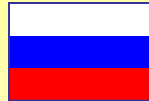
## About the Arctic



Finland  
Arctic  
Strategy



Canada National  
Arctic Policy



Russian  
Arctic  
Strategy



Arctic Council  
Reaffirms  
UNCLOS



ARCTIC COUNCIL

Arctic Council  
SAR MOU Draft

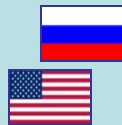
## Within the Arctic



Chinese  
research  
cruise



US & Other  
International  
Research



Vigilant Eagle 2010



Arctic Crossroads 2010



Multiple NSR transits



US-CAN ECS survey



NWP cruise  
Ship & Oil Tanker  
groundings



Russian Oil  
Tankers Collide



*Navy is engaging with Arctic & non-Arctic countries*





# Navy Accomplishments: April 2010 – April 2011

## Education



Naval Post Graduate  
School Arctic Science  
& Security theses



Arctic science  
& security  
Study topics  
at US Naval  
Academy



Naval War College  
courses address  
Arctic Science &  
Security Topics

## Studies & Assessments



Naval Arctic  
Mission Analysis



Naval Studies  
Board study



Naval Arctic  
Capability Based  
Assessment

## Outreach & Engagement



NSS  
Interagency  
Policy  
Committee



State  
Department  
Arctic Policy  
Group



Conferences,  
Symposia,  
Media events



Leadership  
visits &  
staff talks

## Policy, Strategy, & Plans



Support  
Arctic Section  
In 2010 UCP



Navy  
Arctic  
Strategic  
Objectives

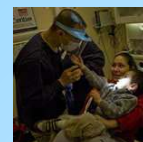


USN-USCG  
Arctic Activity  
Plan

## Operations & Training



Navy-NOAA  
Bering Strait  
Survey



Arctic Care 2010



ICEX 2011



USS Taylor Port  
Visit to Murmansk



Pacer Goose



Operation  
NANOOK/NATSIG

## Science & Research



NRL  
Kara Sea  
Research cruise



Interagency partnership  
For air-ocean-ice  
numerical prediction



Science Ice  
Exercise Plan

*Improve understanding*

*Ensure readiness (resilience)*



# Navy Arctic Strategic Objectives

*Signed by CNO on 21 May 2010*



**I. Contribute to safety, stability, & security in the region**



**IV. Strengthen existing & foster new cooperative relationships in the region**

**II. Safeguard U.S. maritime interests in the region**



**V. Ensure Navy forces are capable and ready**

**III. Protect the American people, our critical infrastructure, & key resources**



***Towards the desired end state: a safe, stable, and secure Arctic***



# Navy Activity On and Under the Ice

## Technology Demonstrations – ICEX-11



Aerial resupply



SSN 778 surfaced



Ice-mining



VIP visit

## Interagency Research Efforts – Operation Ice Bridge 2011



Greenland Ice Sheet







# NANOOK/NATSIQ

## Environment

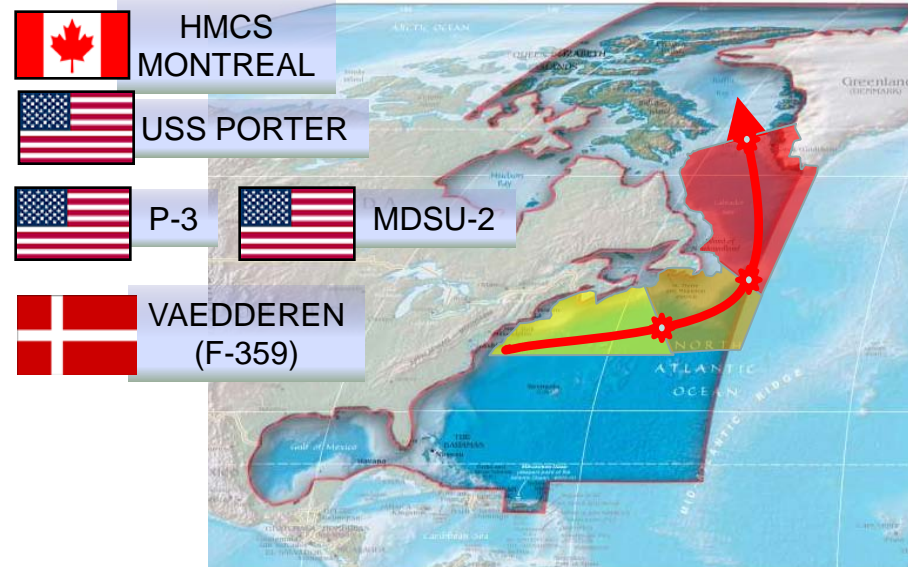
- Daily fog, air temp 30s-40s °F
- PPE required but expensive

## Engineering

- Water production reduced

## Logistics:

- No in-port replenishment north of St. Johns



## Training

- Ice module for ship simulator is vital

## Communications

- Intermittent
- Data transfer rate significantly reduced

## Recommendations

- Include replenishment ships





# Naval War College

## Global Shipping Game - Arctic Results



### Change is Gradual

- *But preparing for the challenges (hardening vessels, logistics facilities) has long lead time (>10 years)*



### Arctic economic viability

- *Understanding this is essential to identifying regional security implications*
- *Resource extraction will continue to be the priority*
- *Destination shipping will predominate over global trade*



### U.S. Accession to UNCLOS

- *National imperative (players were unanimous)*
- *U.S. risks being marginalized if actions, policies & investments don't keep pace with economic development in the Arctic*
- *Alternative opinion: U.S. power provides enough leverage to secure national interests*



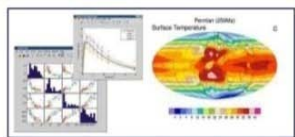
# Improving Understanding

## ONR Initiatives

### More Interagency Collaboration

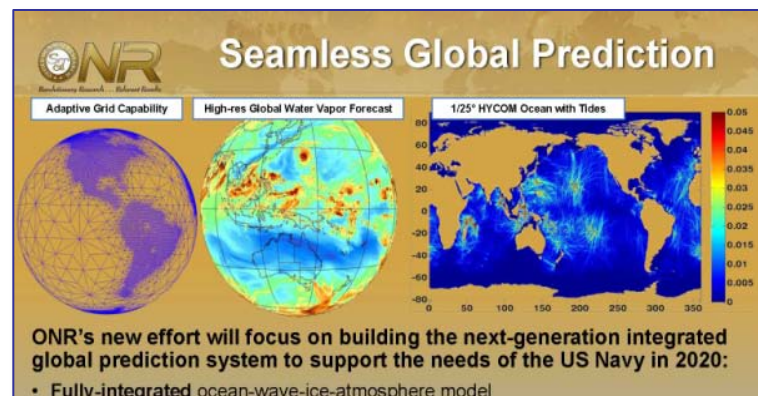
#### Earth System Prediction Capability

Recapitalize aging suite of global atmospheric models



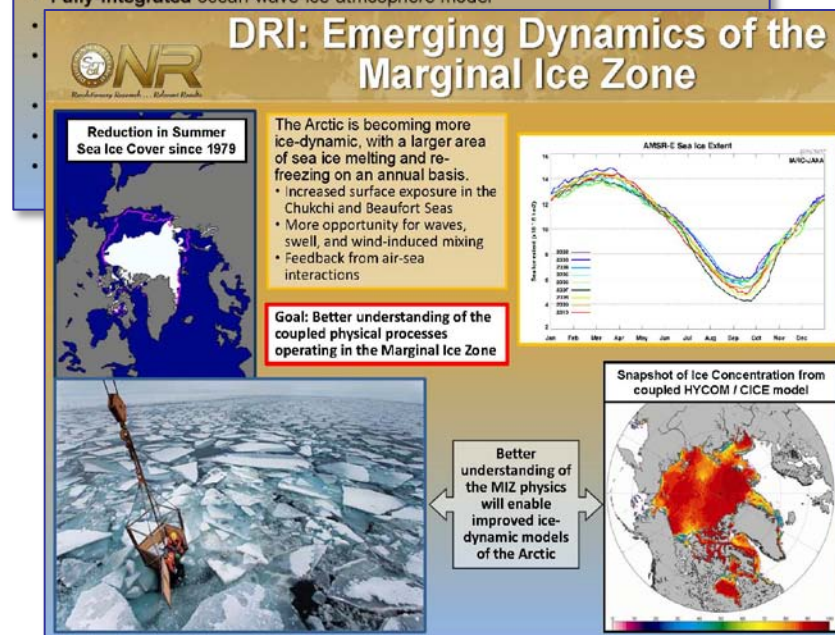
Implement interagency collaboration

Revolutionary advancement National predictive architecture



ONR's new effort will focus on building the next-generation integrated global prediction system to support the needs of the US Navy in 2020:

- Fully-integrated ocean-wave-ice-atmosphere model





# Navy Engagement

## Defense



Coordination & support  
to multiple OSD offices



USEUCOM / SACEUR  
Flag-level meetings



USPACOM  
Environmental  
Security Conference



USNORTHCOM  
Flag-level Meetings

## National



National Ocean Policy  
Implementation



National Security Staff's  
Arctic Interagency Policy  
Committee



US Global Change  
Research Program

## Congressional



US-UK Statement to US CODEL



House sub-committee  
testimonies



Multiple briefings to HAC-D,  
SAC-D, HASC, and SASC staffs

## International



Operation NANOOK/NATSIQ



USS Taylor Port Visit to  
Murmansk



Conferences & symposia



US – Foreign Navy Staff Talks

## Media



Radio interviews



ClimateWire

On-line publications

The Washington Post  
The New York Times

Traditional printed outlets

## Demonstrating leadership



# Some Final Thoughts ...



***“There’s a lot of water where there used to be ice,  
and now I’m responsible for it.”***

Admiral Thad Allen, USCG (ret)



***“We have not got the money,  
so we have to think.”***

Sir Winston Churchill



***“If anyone invades Canada from the North,  
my first job would be to rescue them.”***

Admiral McFadden, Canadian Navy





# Questions?

